

# THE ROSE ITS HISTORY



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WITH THE COMPLIMENTS OF  
MRS. PETRO IV. OROZOFF ET FILS.  
RAZANLIT, BULGARIA.

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# THE ROSE—ITS HISTORY

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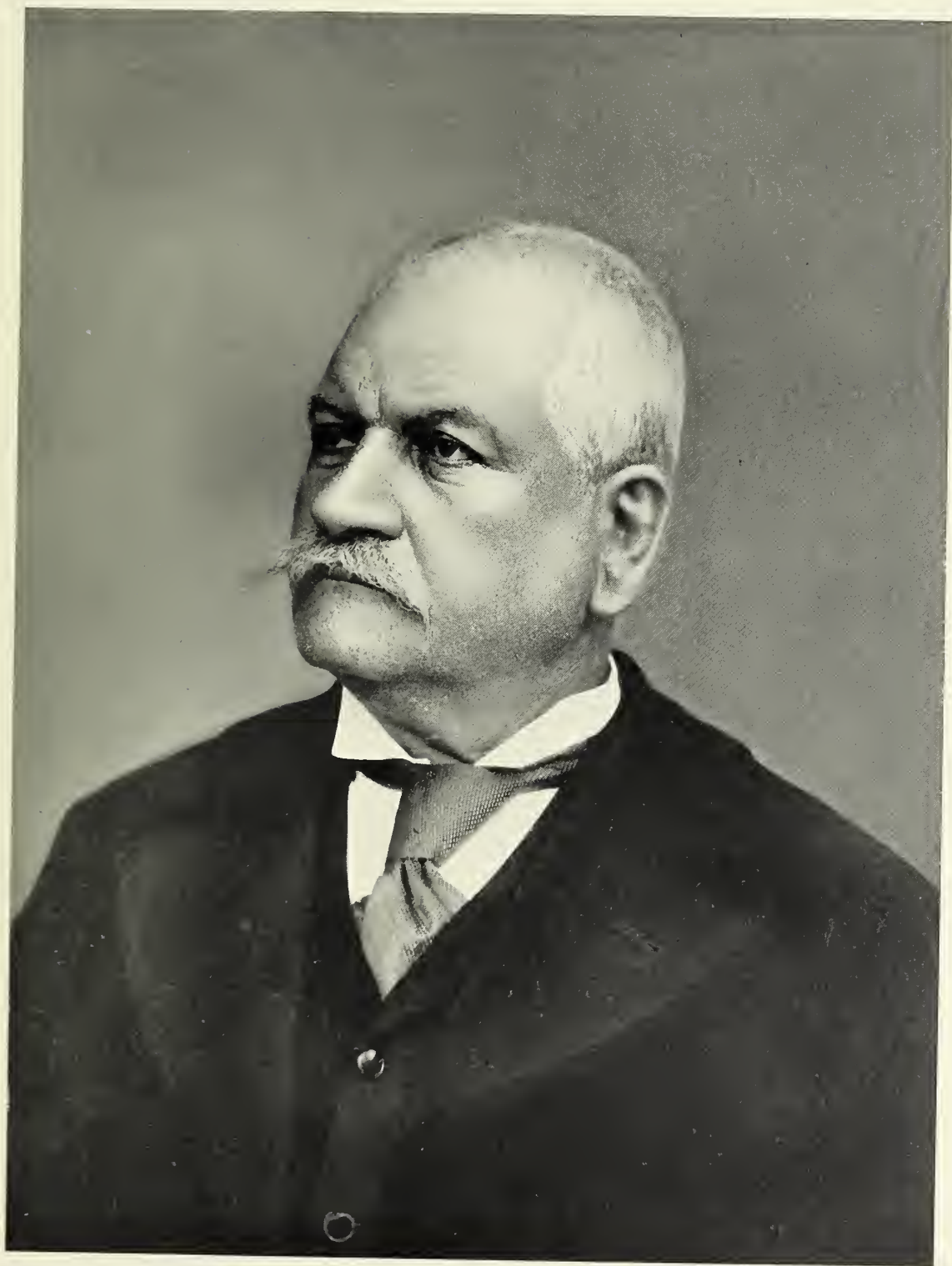
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SHIPPERS & DISTILLERS OF GENUINE BULGARIAN OTTO OF ROSE.







MR. P. I. OROZOFF, FOUNDER OF THE FIRM PETKO IV. OROZOFF ET FILS.

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## PREFACE.

“Would Jove a Queen of Flowers ordain,  
The Rose, the Queen of Flowers, should reign.  
The Grace of Plants! the pride of bowers,  
The Blush of Meads, the eye of flowers,  
Her sweets the breath of love disclose,  
Cythera's favourite bloom she glows.  
What flower is half so lovely found,  
As when, with full-blown beauties crowned,  
The Rose each ravished sense beguiles  
And on soft amorous Zephyr smiles?”

*Sappho—Ode to the Rose.*





A ROSE GARDEN AT ENINA, NEAR KAZANLIK





# THE ROSE—ITS HISTORY

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**T**HAT Cleopatra should have once covered the floor of her dining hall with Roses to the depth of a cubit, and that Nero should have expended £30,000 on Roses for a single feast, are facts sufficient to indicate that the Queen of Flowers is of no upstart origin.

Indeed, we may find many references to the flower in old literature, but it was not until the extraction of its perfume became possible that these references become of pointed interest to us. We believe that the earliest record of the use of the Rose for this purpose is to be found in a document in the Bibliothèque National, where, on the authority of one Ibu Khaldun, we are informed that between the years 810 and 817 A.D., in the reign of Kaliph Mamoun, the province of Faristan in Persia had to pay an annual tribute of 30,000 bottles of rose water to the Treasury of Bagdad. It is also stated that a considerable quantity of rose water was exported from Faristan to China, India, Yemen, Egypt, Andalusia and Morocco.

There is no doubt that the art of distillation of the Rose was introduced from the East to the West by the Arabs, and in

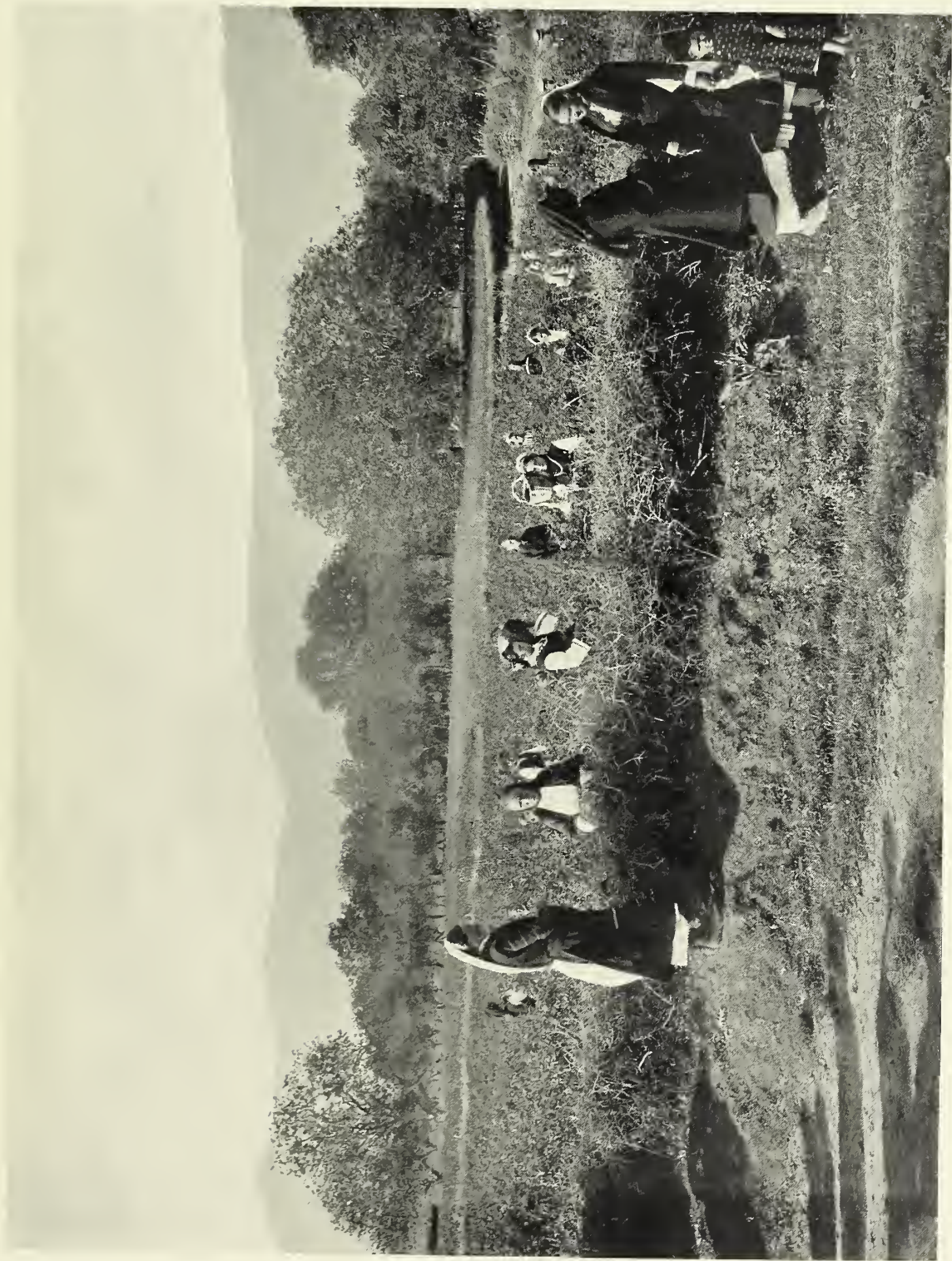
an old work entitled "Le Calendrier d'Harib," we find it recommended that oil of roses should be distilled in the month of April (this was in 961 A.D. in the East).

The famous Rose gardens of Persia were situated in the neighbourhood of Shiraz, the Roses grown here being said by Kaempfer to excel in profusion and fragrance those of any other locality in Persia. As we speak of the Rose as the Queen of Flowers, so in Persia it is called "Gul," that is, "the flower" without further gratification.

The discovery of the separation of the essential oil from the distillation water appears to have been made in or about 1574 by one Geronimo Rossi. It is also described in 1589 by Porta, again by Sula in 1610. A careful comparison of dates shows that although the art of distilling rose water was practised in the East long before it was in the West, the discovery of the separation of the Otto was made in Europe some forty years before the same discovery was accidentally made in the East. The following version of its discovery in Persia is to be found in a History of the Great Moguls, by Mohammed Achem, in the chapter entitled "Marriage of the Princess Nour-Djihan with the habitant of the paradise Djihan-guyr; inventions and discoveries of the Queen of the World." At the marriage a great fête was prepared, and every extravagance was indulged in. The Princess even had a canal constructed in the old flower garden, through which Rose Water was allowed to flow. Whilst the Emperor and the Princess were walking along the banks of the canal, they noticed an oily liquid floating on the surface. This was collected and recognised by the whole Court as the most delicate of perfumes. The designation "Aettr-Gyl" was given to this essence (literally "fat of the flower"), from which the English Attar or Otto of Rose easily follows.

From Persia the industry of distillation spread to India; but so far as we are concerned, the only important development is that which spread to the famous Rose gardens of the world—





GATHERING ROSES NEAR KAZANLIK



Bulgaria. It is about 220 years ago that the culture of the Rose was introduced into Bulgaria (then known as Eastern Roumelia) by a Turkish merchant. The industry was also taken from the African Coast to Provence. To-day we find the cultivation of the Rose established also to some extent in Germany, Tunis, Algeria, Egypt and Morocco.

After this brief historical description, we may pass on to the present-day conditions as they exist in the Balkans, whence comes the greater portion of the world's supply of Otto of Rose.

## II.

### THE CULTURE OF THE ROSE IN BULGARIA.

To secure the most successful results in the culture of the Rose several conditions are essential. The soil should be easily permeable to water—hence the sandy slopes of the southern sides of the Balkans are so favourable to good growth. Shelter from the cold north winds in the winter months is also an important factor. Excess of unseasonable rain in the cold weather, especially when followed by a frost, is very damaging to the plants. Early and excessive droughts are equally dangerous. Besides the fact that such dryness retards the usual development of the rose tree, one has also to remember that it facilitates the premature development of one of the most dangerous parasites of the plant, known as the Tchervey (the Bulgarian word for maggot), a species of larva, born in spring, which forces its way into the bark of the young shoots, and describes a ring round the bark. The only outward sign of this dangerous disease is a slight swelling on the surface of the epidermis. But directly this is visible, the branch commences to wither away, and if touched, will break off like dead wood.

Plenty of fuel and water in the immediate locality is an essential for good results, as the flowers must be distilled very soon after they are picked.



In Bulgaria the rose bushes are planted close together, forming compact hedges, in rows of about fifty to one hundred yards in length. The full height of the mature plant is six to seven feet. Between each row a space of about six feet is left, allowing two men to walk abreast. Propagation is usually effected by cutting down or digging up entire bushes. The branches spring from the bottom of the stem, so that the stump, with as much root as possible, is divided into as many pieces as convenient, and these pieces are planted four or five abreast in long trenches about 15 inches wide and deep. They are lightly covered with mould, and a thin dressing of manure is thrown over the top. Plenty of watering is now required. The usual time for this planting is October or November; the young shoots make their appearance about April, when much weeding is necessary. In the following November, mould is heaped up to the base of the young shoots. In the May following, the plants will be nearly two feet high, and will yield a few flowers. Next year they are in full bearing. When they are five years old they will yield their largest crop. Harvest commences about the third week in May, but the season will be slightly advanced or retarded according to the climatic conditions. There is sometimes a second small gathering in November, but it is quite unimportant. After harvest the ground is well cleaned from weeds, and in October it is lightly manured. Earth is then hoed up to the roots of the bushes to protect them during the winter months. Pruning takes place in March, when all withered shoots are removed. In April the lanes between the hedges are ploughed, and the winter's mould round the bushes is levelled with the rake. Rain is the best source of water, and trees that have not been artificially watered are usually more hardy than those which have been so treated. With advancing age the bushes interlace, and form close thickets. A really carefully-tended plant will have a life of twenty years, but this is under ideal conditions only.



GATHERING ROSES AT CHIPKA, NEAR KAZANLIK.





The Rose cultivated for Otto in Bulgaria is a variety of *Rosa Damascena*, the red Damask Rose. It is to be distinguished from the English Cabbage Rose (Provence Rose), *Rosa Centifolia*, which is cultivated for Rose perfume in the South of France, by the greater size of its spines, its green bark, elongated fruit and longer reflexed sepals. Its tendency to yield a second crop of flowers in November exemplifies the tendency which all the descendants of *Rosa Centifolia* have to revert to the original type.

*Rosa Damascena* is not known in an uncultivated condition, and is believed by Baker to be merely a variety of *Rosa Gallica*, which was distributed from France to Mesopotamia. The borders of the Bulgarian plantations are usually defined by hedges of a white rose, *Rosa Alba*. This plant is a bush of more vigorous growth than *Rosa Damascena*, and flowers just a little later. Its perfume is not so good as that of the red rose. Its otto, however, is of good odour, but contains more stearoptene than that of the red rose. The flowers are usually plucked and mixed indiscriminately with those of the red rose when harvesting takes place.

The region of cultivation of the Rose in Bulgaria covers the northern portion of the old Turkish province of Eastern Roumelia.

It is bounded on the north by the great Balkans. Acclimatization of the plants to the north of these mountains has not been found practicable, experiments at Travna having proved failures. The principal rose valleys are those of Toundja (canton of Kazanlik) and Strema (Karlovo), which are bounded on the south by the Lesser Balkan hills, known as the Sredna-Gora range. The southern slopes of this range in their turn provide numerous sites for suitable cultivation. But it is usually maintained that the general conditions holding on these slopes, especially the more scanty supplies of water and fuel, cause the otto produced to

be of inferior value to that distilled on the slopes of the Balkans proper. Finally a small amount of excellent otto is produced from Roses grown in a few districts south and south-west of Phillipopolis. The principal districts, following their political denominations, in which the industry is carried on, are as follows:—

The cantons of

- (1) Kazanlik.
- (2) Karlovo.
- (3) Nova-Zagora.
- (4) Stara-Zagora.
- (5) Tchirpan.
- (6) Novo-Selo.
- (7) Brezovo.
- (8) Pechtera.

So far for the cultivation of the Rose in the Rose gardens of the world. It will not be necessary for us to enter into any details of the cultivation of the flower in Germany or France, as what little otto is produced in these countries is absorbed locally in the main, and the world depends essentially for its supply on the Bulgarian output. We may therefore now pass on to

### III.

#### THE HARVESTING AND DISTILLATION.

In very hot summers the harvesting takes place most rapidly, and the whole of the plants may complete their flowering in from fourteen to twenty days; but in more normal seasons, with moderate temperatures and warm, frequent rains, the harvest may last a full month. The time of the rose-gathering in normal years lies between the 15th and 25th of May, and finishes about the middle of June. Such normal harvests are by far the most profitable to the distillers, and the otto produced is probably of finer quality than when the distillation has to be





GENERAL VIEW OF MAGLISHE.



forced along too rapidly. For example, if a rapid harvest takes place, lasting only fourteen days, the same number of stills will have to deal with twice the weight of flowers per day that have to be treated in a harvest lasting a month, and the risk of burning the flowers and so imparting a bad odour to the otto is great. Women and children usually gather the flowers, and picking commences at daybreak. The flowers are picked with their sepals on, and these are not separated at all, the whole flower being distilled. Roughly, 1000 roses weigh one kilogram, and a hectare (about 2.5 acres) yields about 3,000,000 flowers, which yield, in their turn, about one kilo of otto. Thus, it takes about 100,000 roses to yield an ounce of otto. Every open or half-opened flower is gathered, frequently, when the early morning dew is on them, as it is most important that they should not be gathered whilst the heat of the sun is on them. Picking usually continues till 10 or 11 o'clock, or if the day be cloudy till considerably later. Roses gathered when the sun is hot on them have a comparatively feeble odour, and yield much less otto. The flowers are carried as quickly as possible to the distilleries, where they are distilled as rapidly as possible. In times of very rapid harvests the flowers come in too rapidly, and the flowers may often be left twenty-four hours before being distilled.

When such is the case much loss is occasioned, as the flowers deteriorate and lose their fragrance, and often begin to ferment, thus yielding a much inferior otto. The obstruction at the distillery, owing to the number of flowers, may even be so great that all the flowers cannot possibly be distilled, and may have to be thrown away. The few large distilleries not only distil their own roses, but buy all those in the immediate neighbourhood from peasant growers who have not the good fortune to possess a still. The lack of water is another frequent reason why a peasant has to sell his flowers, as distillation is then impossible.



Apart from a few steam distilleries which have recently been erected, the stills are of a very primitive kind. The difficulty of the steam still—which yields an otto of rather different character from those of normal Otto of Rose—is the fact that the great expenditure necessary is out of proportion to the short time that distillation lasts. And until more work, through the cultivation of plants of a different character, is found for the stills, this pecuniary difficulty will always be a serious one.

The stills are built up under rough wooden sheds, open on one side. There may be one or two in a peasant's distillery, or a large number in a row in the case of the merchant-distiller. The condensation water is, in the more primitive distilleries, led by a wooden gutter fixed to the roof, and as it passes each of the condensing tubs, it gives a supply of cold water to each condenser. It is obvious that the best position for the distilling sheds is near a watercourse. In the poorer peasants' farms, the distillation sheds are merely temporary thatched huts put up to last the harvest time. The absence of a water supply, of course, forces a peasant to sell his harvest to the nearest distillery.

The stills, or alembics, are made of sheet copper, and are in the shape of a truncated cone. The body is about 3 ft. 6 in. in height, consisting of a bottom piece and a superimposed portion joined at the middle by a tin band. The diameter of the body at this point is about 2 ft. 8 in. The diameter of the neck is about 10 inches. The head somewhat resembles the shape of a mushroom, and is about 12 inches in height. From this head a straight, inclined tube leads to a worm condenser in a tub of cold water. The average contents of a still are about twenty gallons, the charge usually being about ten kilos of flowers and seventy-five litres of water.

A brisk fire is kept up for an hour or two, and when ten litres of the liquid have distilled over, the fire is drawn. At times



fifteen litres are distilled, but the resulting Otto then contains more stearoptene than usual. The still is then opened and the exhausted flowers are thrown away, and the residual hot water, made up to seventy-five litres with cold water, is returned to the still with a fresh charge of flowers. The operation is repeated until about forty litres of distillate are collected. This is now redistilled, and the first five litres collected in a long-necked flask. The remaining thirty-five litres are used for distilling again with fresh flowers. The five litres collected are allowed to stand, and the Otto floating on the surface collects in the neck of the flask, from which it is removed by a tiny tin funnel with a very small orifice to allow the water to drain away.

It cannot be denied that this method of treating so delicate a flower as the rose, by distillation over a naked fire, is very primitive and little short of barbarous. But there is no doubt that, as the conditions become more favourable, more scientific methods of distillation will be adopted. The details of the distillation are, of course, varied, but the only important variation to which attention need be called is that by which the so-called "green otto" is obtained. This Otto is of a greenish colour, and is said to be obtained by allowing the first distillation waters to stand, and the oil floating on the surface is separated without any further distillation of the water.

At one time it was a common practice to sprinkle the leaves with so-called Turkish geranium oil, and so obtain a high yield of otto heavily adulterated. Such practices are, of course, still common, but to-day one can say with certainty that there are many honest distillers of Otto of Rose in Bulgaria.

So much for the harvesting and distillation of the Otto. It is not necessary to deal with the manner in which these operations are carried out in other countries, as their importance in the Otto of Rose trade is quite insignificant as compared with that of Bulgaria.

We therefore now pass on to the

## IV.

### CHEMISTRY OF OTTO OF ROSE.

The nature of the constituents of Otto of Rose is now pretty well settled, although much difference of opinion existed some ten years ago as to the exact character of the principal alcoholic compounds present. Markovinkoff and Reformatsky originally stated that the principal alcohol present was a compound of the formula  $C_{10}H_{20}O$ , which they termed roseol. Poleck and Eckart claimed that it had the formula  $C_{10}H_{18}O$ , and was identical with geraniol. The name rhodinol was also suggested for this body, and for an alcohol or mixture of alcohols extracted from geranium oil by Barbier and Bouveault. Finally, Bertram and Guildemeister showed that the principal alcoholic constituents were a mixture of two alcohols, of which geraniol  $C_{10}H_{18}O$  was present in greater amount, the other alcohol being citronellol,  $C_{10}H_{20}O$ .

Otto of Rose consists of a number of liquid compounds, containing a certain amount of a mixture of solid crystalline hydrocarbons which are in solution, when the Otto is kept above its melting point, but a portion of which separate out and give the Otto its characteristic semi-solid appearance when the temperature is below the melting point of the Otto. The solid matter, usually known as the stearoptene, is quite odourless. It consists of two or more hydrocarbons, probably of the paraffin series. Two have been separated, melting at  $22^{\circ}$  and  $41^{\circ}$  respectively. The stearoptene itself usually melts between  $35^{\circ}$  and  $40^{\circ}$ , generally at  $36-38^{\circ}$ .

The liquid portion of the Otto is the odour-bearer. It consists of the following bodies :—

GERANIOL, an open chain alcohol of the constitution.

$(CH_3)_2, C : CH, CH_2, CH_2, C(CH_3) : CH, CH_2, OH.$

It is a pleasant-smelling liquid, boiling at  $229^{\circ}$  under normal pressure. It has a specific gravity 0.881 at  $15^{\circ}$ , and





A VILLAGE DISTILLERY, NEAR KAZANLIK.





a refractive index  $1.4776$  at  $20^{\circ}$ . It is optically inactive. Traces of esters of this alcohol are also present, as well as of free acetic acid, resulting from the decomposition of these esters.

CITRONELLOL. An open chain alcohol of the constitution.

$C(CH_3)_2: CH, CH_2, CH_2, CH(CH_3), CH_2, CH_2, OH$ .

It is a sweet smelling oil of specific gravity  $0.8565$  at  $15^{\circ}$  and refractive index  $1.4566$  at  $20^{\circ}$ . It boils at  $117^{\circ}$  at  $17$  mm. pressure, and is optically active to the extent of  $+4^{\circ}$  or  $-4^{\circ}$ .

NEROL. Small quantities of Nerol, an alcohol also found in oil of Neroli, are also present. This body is isomeric with geraniol and has the formula  $C_{10} H_{18} O$ . It has a specific gravity  $0.8814$  at  $15^{\circ}$  and boils at  $225$  at  $740$  mm. pressure. It is probably a stereo-isomer of geraniol, since both alcohols yield the aldehyde citral in isomeric forms on oxidation.

EUGENOL. Traces of the phenol Eugenol (about 1%), the characteristic odour bearer of oil of cloves, are also present. This phenol has the formula  $C_{10} H_{12} O_2$  and is the methyl ether of allyl-dioxybenzene.

FARNESOL. A small quantity of a sesquiterpene alcohol,  $C_{15} H_{26} O$  is present. This alcohol has a specific gravity  $0.894$  at  $15^{\circ}$  and boils at  $149^{\circ}$  at  $4$  mm. pressure. It is probably identical with the alcohol farnesol, isolated from cassie flowers. It is present to the extent of about 1%.

CITRAL.  $C_{10} H_{16} O$ , the aldehyde resulting from the oxidation of geraniol, is present in traces. It is an oil of specific gravity  $0.897$  at  $15^{\circ}$  and is optically inactive. It boils at  $228-230^{\circ}$  at ordinary pressure, and has a refractive index  $1.4931$ .

LINALOL.  $C_{10} H_{18} O$ . This is an alcohol isomeric with geraniol and occurs to a very small extent as a laevorotary oil of specific gravity  $0.872$  and refractive index  $1.4611$ . It boils at  $198^{\circ}$  at  $760$  mm. Its optical activity is about  $20^{\circ}$ .

NONYLIC ALDEHYDE.  $C_9 H_{18} O$ , an oil of specific gravity 0.8277 and refractive index 1.4245, has been isolated in very small amount.

PHENYL-ETHYL ALCOHOL.  $(C_6 H_5) C_2 H_4 OH$ , also occurs in traces, but as it is very soluble in water, nearly all that may be present in the normal essential oil of the Rose is lost during distillation, owing to its going into solution in the distillation waters.

There are various other bodies present in Otto of Rose, which, although only occurring in traces and not yet definitely identified, have a considerable effect on the delicacy of the odour. The presence of traces of such bodies explains the failure of all synthetic Ottos to in any degree compete with the pure natural product.

We may now pass to the methods of ascertaining the purity or otherwise of Otto of Rose.

## V.

### THE ANALYSIS OF OTTO OF ROSE.

Here one has to admit at once that we are forced to rely on physical tests rather than chemical. If a sample does not possess the typical sweet odour known as the "odeur ambrée," it may be rejected as adulterated.

The physical characters which have to be determined are as follows:—The specific gravity (test taken at  $30^{\circ} C.$ , as compared with water at  $15^{\circ}$ ); the optical rotation; the refractive index taken at  $25^{\circ} C.$ , and the melting point.

The following may be regarded as the limits for pure Bulgarian Otto of Roses, outside which samples will very rarely go.



VIEW OF ENINA, NEAR KAZANLIK





Specific Gravity at  $30^{\circ}$  -  $0.8490$  to  $0.8565$ .  
Optical Rotation (100 mm) -  $-2^{\circ}$  to  $-3^{\circ}30'$ .  
Refractive Index at  $25^{\circ}$  -  $1.4590$  to  $1.4630$ .  
Melting Point - - -  $21^{\circ}$ - $24^{\circ}$ .

The determination of the amount of stearoptene is not important except in rare cases, since it is generally in proportionate relation to the melting point. But the melting point of the stearoptene is of importance, as it should lie between the limits of  $35^{\circ}$  to  $39^{\circ}$ .

According to some chemists a determination of the iodine absorption value of the Otto is of importance. It is said that this figure should lie between 187 and 194, whereas it is much higher in the case of all the usual adulterants.

Special tests will be made for such adulterants as alcohol, which can be distilled off and identified by the iodoform reaction. The old adulterants of Otto of Rose, such as the so-called Turkish geranium oil and Santal wood oil, are no longer used, except in a few isolated cases. The modern adulterants are much more scientific. They consist in nearly every case to-day of either geraniol or a mixture of geraniol with other alcohols of a similar type, so manipulated as to imitate pure Otto of Rose in its physical characters. It is therefore absolutely necessary that the Otto should not only have the characters of a genuine Otto, but should also be judged on its odour as well. A sample may well be condemned if it lacks anything in either respect—*i.e.*, in its odour or in the requisite characters of a genuine Otto, as determined chemically and physically.

Some chemists lay stress on the characters of the Otto after it has been deprived of its stearoptene and the following table has been compiled by Jeancard.

Melting point of the Otto	-	-	-	-	19°-21°
Stearoptene present	-	-	-	-	18-23%
Specific gravity when stearoptene free	0.886	-	0.888	-	
Rotary power	„	„	„	-	-1° to -3°
Solubility in % % alcohol	„	-	-	-	1 in 1.5.
Acid value	-	-	-	-	- 1-2
Ester value	-	-	-	-	10-12
Alcohols	-	-	-	-	84-88%
Citronellol	-	-	-	-	30-40%

## STATISTICS OF OTTO OF ROSE.

The following tables will give the fullest information with regard to the production and consumption of Otto of Rose. They are as follows :—

- (1) Table showing the duration of the harvest and the production and price of Otto in Bulgaria during a typical season (1905).
- (2) Table showing the comparative yields for 1899, 1903 and 1904.
- (3) Table showing the number of stills at work.
- (4) Table showing the exports to the various consuming countries.



STREET IN KAZANLIK.





TABLE I.

Showing the duration of the Harvest and the production and price of Otto of Rose in Bulgaria during a typical Season—1905.

DISTRICTS.	Duration of the Harvest.		Area of the Gardens in 1000 metres.	Kilos of Flowers yielded per 1000 metres.	Price of 1 Kilo of Flowers in centimes.	Kilos of Roses to yield 1 muscal of Otto.	Yield in Muscals.	Mean temperature of congelation in degrees Reaumur.	Mean price per Muscal in francs.
	Date of commencement and finish.	Days.							
Kazanlik .....	5/5 - 20/6	46	27,161·5	50 - 620	10 - 17	13 - 32	235,599	14 - 16 R <sup>o</sup>	2·40 - 3·20
Karlovo.....	7/5 - 19/6	43	30,165·4	70 - 620	12 - 20	12 - 25	284,189	12 - 15 "	2·45 - 3·10
Nova-Zagora .....	8/5 - 25/6	48	2,292·5	50 - 250	12 - 20	12 - 20	18,261	14 - 16 "	2·60 - 3·20
Plovdiv .....	5/5 - 10/6	36	7,878·5	50 - 450	10 - 20	10 - 20	88,944	12 - 15 "	2·50 - 3·20
5 Pechtera .....	3/5 - 21/6	49	1,974·4	80 - 250	12 - 30	11 - 15	23,003	14 - 17 "	2·70 - 3·0
Panagurska .....	18/5 - 15/6	28	591·3	130 - 350	10 - 12	16 - 20	5,840	14 - 15 "	- 3·0
Stara-Zagora .....	10/5 - 18/6	39	2,965·9	60 - 400	12 - 25	12 - 20	29,454	14 - 17 "	2·30 - 3·20
Stanimachka .....	12/5 - 5/6	24	25·0	90 - 105	12 - 20	15 - 16	183	14 - 15 "	- 3·0
Pazardjik .....	11/5 - 10/6	30	77·4	140 - 175	12 - 15	12 - 13	1,230	14 - 15 "	- 3·0
Tchirpan .....	5/5 - 13/6	39	4,607·5	75 - 380	10 - 20	11 - 17	50,015	12 - 16 "	2·30 - 3·0
Slivenska .....	8 - 25/5	17	8·5	- 112	15 - 25	- 17	35	15 - 16 "	- 3·0
Sevlievska.....	25/5 - 15/6	21	42·3	- 80	12 - 15	- 16	200	14 - 15 "	- 3·0
	3/5 - 25/6	54	77,890·2	70 - 650	10 - 30	10 - 32	736,953	12 - 17 "	2·30 - 3·20

208 Muscals = 1 Kilo.

TABLE II.

Showing the comparative yields for 1899, 1903 and 1904.

DISTRICTS.	1899.		1903.		1904.	
	Essence of Rose obtained.		Essence of Rose obtained.		Essence of Rose obtained.	
	Kilogrammes.	grs.	Kilogrammes.	grs.	Kilogrammes.	grs.
Kazanlik - - - -	847	100	1377	470	1386	210
Karlovo - - - -	774	560	1461	970	1688	690
Panagurichté - - -	12	450	28	110	27	570
Péchtéra - - - -	82	820	121	890	92	790
Philippopoli - - -	202	260	459	130	458	730
Nova-Zagora - - -	45	180	131	940	94	70
Stara-Zagora - - -	83	840	162	690	169	750
Tchirpan - - - -	89	870	327	460	268	600
Other Districts - -	4	410	6	90	11	120
Kgs.	2142	490	4076	750	4197	530



GENERAL VIEW OF THE VALLEY OF ROSES OF KAZANLIK AND THE RUSSIAN MONASTERY AT CHIPKA





TABLE III.  
Showing the number of Stills at work.

DISTRICTS.	Distilleries de 1 — 5 Stills.	Distilleries de 5 — 10 Stills.	Distilleries with more than 10 Stills.	Distilleries. Total	Stills Total.
Kazanlik - - - -	995	195	45	1235	4738
Karlovo - - - -	570	249	74	893	4832
Nova-Zagora - -	53	23	6	82	433
Plovdiv - - - -	113	81	25	219	1291
Péchtéra - - - -	91	12	—	103	385
Stara-Zagora - -	46	32	11	89	573
Tchirpan - - - -	107	37	5	149	737
Other Districts -	20	6	2	25	139
Total.	1995	635	168	2798	13128

TABLE IV.  
Bulgarian Government Statistics of the Exports of Otto of Rose.

Year	-	-	-	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.
Austria	-	-	-	64	23	23	106	93	22	38	64	23	23
England	-	-	-	680	686	707	633	1174	472	521	1054	472	891
Germany	-	-	-	693	583	471	360	568	345	518	1027	853	714
Italy	-	-	-	—	—	7	3	9	12	20	36	19	20
Russia	-	-	-	102	47	134	155	202	119	127	272	163	238
America	-	-	-	—	12	380	716	849	760	850	1467	809	1641
Turkey	-	-	-	495	680	872	582	886	564	573	393	578	230
France	-	-	-	1271	1151	761	1033	1548	728	1011	1870	1445	1529
Other Countries-				7	10	75	6	17	5	18	27	32	30
Total Kgs.	-	-	-	3312	3192	3430	3594	5346	3027	3676	6210	4394	5316



DESPATCHING ROOM AT MESSRS. PETKO IV. OROZOFF ET FILS.







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